Response to *A Climate of Opportunity*

August 2008

PUBLIC TRANSPORT USERS ASSOCIATION

Contents

247 Flinders Lane
MELBOURNE VIC 3000
www.ptua.org.au

ABN 83 801 487 611

1 Position Victorian industry

1.1 New jobs, technologies and markets

It is expected that a major government policy and investment response to climate change and the need to reduce greenhouse emissions will be significant investment in public transport infrastructure and services in Victoria and other jurisdictions. Rail infrastructure is vital to address climate change and open new prospects for innovators and entrepreneurs. The building of additional public transport and rail freight infrastructure will build on Victoria's skills and knowledge base to provide jobs and investment to contribute to a low carbon economy and capitalise on the mode shift from the private car to public transport and from trucks to rail freight.

Heavy and light rail are expected to be major beneficiaries of investment to address public transport availability and accessibility – including an increased frequency of services, the opening of new lines, increases in capacity to existing lines and the consequential need for additional and refurbished rolling stock. Such investment will often jointly benefit rail freight and improve the efficiency and sustainability of supply chains.

However, there has been a significant market failure over many decades that has seen underinvestment in public transport facilities. There is an urgent need to redress this imbalance within a few years, not over decades of catch-up.

Victorian manufacturing industry is well placed to benefit from investments in heavy and light rail infrastructure and rolling stock. For example, the local industry has an established track record in supplying high standard VLocity motor and trailer carriages.

Since 2007 the Victorian government has in process the following contracts for purchase of rail and tram rolling stock:

- 18 six carriage X'Trapolis trains (Alstom) to rollout from late 2009, value $634 million;
- 40 VLocity Diesel Multiple Units (DMU) and 22 VLocity trailer carriages;
- lease five lowfloor trams from Mulhouse until 2011; and
- nine x three car VLocity DMU and one trailer (Bombardier Transportation).

In announcing the nine x three car VLocity contract on 31 July 2008, Premier John Brumby proudly declared:

> "This is not only great news for regional train travel but for industry and the Dandenong area as well, with all of the carriages to be built here in Victoria…
> "Bombardier is one of the great success stories of Victorian manufacturing and this new order will secure local workforces and the skill base in Dandenong."

Bombardier, one of the largest manufacturers of passenger rolling stock in the world, has Dandenong is its regional headquarters in Australia. Whilst Bombardier is currently building Electric Multiple Units at their Queensland facility for both the Queensland and Western Australian passenger systems, such vehicles are able to be manufactured at the Dandenong plant.

Trains have been built on the Dandenong site for more than 50 years. ICN and Australian Economic Consultants have estimated that an order of 20 locally built VLocity carriages would generate net benefits of $130 million ($31.5 million additional taxation revenue, $98.9 million economic value added) - equivalent to the creation of 960 jobs. The VLocity DMU is manufactured with over 70% local content at Dandenong and has been benchmarked as the most reliable DMU in the world.

Despite this significant local capability, the state government recently placed an order with French company Alstom for 18 urban train sets which will be manufactured in Europe. The PTUA understands that Alstom was also granted an option to supply a further 26 urban train sets for the Melbourne metropolitan system. The initial contract is valued at $634 million (average $35.2 million per 6 car train) so a further 26 train sets will be approaching a $1 billion investment that will be lost to local manufacturing.

In addition the PTUA understands that the next round of rail orders will include the first 100 (of a 400 total order) of trams or LRV's – the key decision for the state government is where will they be built?

The government's Victoria Industry Participation Policy (VIPP) encourages local manufacturers to be involved in supplying to major government projects. In November 2007, Minister for Industry and Trade, Theo Theophanous said the Victorian Government introduced the VIPP in 2001 to generate greater opportunities for local small and medium sized enterprises to be involved in Government funded major projects and major events. "To date the VIPP has been applied to 765 projects worth a total of almost $15 billion that have generated more than 18,500 new jobs."

Indeed, in enticing Toyota to assemble a hybrid Camry car at Altona, the Victorian government promised financial assistance to Toyota but has not yet disclosed the details of the deal. However, Premier Brumby has announced that the Victorian government would purchase 2,000 Camry Hybrids over the first two years of its production, an estimated cost of $70 million (2,000 cars x $35,000).

Immediate rolling stock purchases are landmark investments by the state government and a generational opportunity to strengthen local industry by enabling scale economies and continuity of production. Flow-on benefits will positively impact employment and skills and downstream to the manufacturing supply chain. An improved rolling stock manufacturing skills base will enhance the ability of local firms to become globally competitive and result in high standard local products.

1.2 Railway Equipment Manufacturing Industry

The variable nature of procurement by railway operators, for either refurbishment or new rolling stock, has meant that major rolling stock manufacturers look to other activities to maintain employment of their production facilities. According to industry sources, overseas countries make better use of forward planning, which assists their manufacturers in production decision-making and the development of local technology and capabilities (*IBISWorld Industry Report – Railway Equipment Manufacturing in Australia C823*, February 2008)

According to IBISWorld, the industry:

- has experienced productivity gains in recent years, with a lowering of labour cost proportion (19.3% in 2007-08);
- makes extensive use of apprentices, developing cost-competitive trade related skills such as machining, metalwork, carpentry, upholstery; and
- is becoming more globalised from a low base. The local industry has attracted attention due to its expertise in manufacturing light rail vehicles, however the privatisation of public rail and tram services has provided an increasing impetus to source rolling stock from overseas.

Given the carbon constraints of peak oil and climate change, it is expected that governments and operators will continue to invest in urban passenger transport projects with better co-ordination between modes and a long-term commitment to refurbishing urban and country passenger rail services. The local industry could play a major role in this, provided there is a level of certainty afforded by government transport policy and planning.

Although present manufacturers have developed a number of world class products and have entered into licensing arrangements with major overseas companies to promote their sales, there are impediments to further development of export markets. These include the high cost of production in Australia, soft loans provided by competitor's governments, differing overseas standards, the long logistics line to support spares from Australia and overseas licensors' market area restrictions.

1.3 Government Policy Role

Federal and State governments are well placed to take appropriate action to facilitate change in the supply economy by focusing on local skills needs and aligning this with industry policies and investment in public transport infrastructure. On the demand side of the economy, measures to reduce the demand for energy (eg. land-use policy) integrated with transport policies to minimise travel requirements, can be combined with travel demand management (TDM), energy efficiency measures, regulation of emissions standards and procurement policies that are greener and encourage growth and innovation of local industry.

Government must work with industry to minimise the risks associated with climate change. Infrastructure represents a long-lived investment that is important to build to cope with future changes. Strong and timely action now will prepare our economy for the challenges and changes to current industry and position Victoria to capitalise on the new technologies, new markets and new jobs that will be created in a low carbon economy.

To encourage the local rolling stock manufacturing industry PTUA proposes that:

- accelerated depreciation for rail rolling stock be allowed – this would encourage operators to place orders;
- a pre-qualified panel of suppliers be established (this supplier panel structure is already in place with governments) so that regular orders can be placed, overcoming the lumpy nature of current rolling stock procurement. Currently tender/bidding costs for major government rolling stock purchases can be expensive or prohibitive and there is a limited number of suppliers;
- incentives improve for encouraging the movement of freight by rail (urban hubs, regional and interstate);

- disincentives against the use of public transport be removed (e.g. motor vehicle FBT regime, non tax deductibility of PT fares, lack of public transport priority measures, poor service frequency); and
- train signalling and control regimes be brought up-to-date to allow more frequent services (e.g. Positive Train Control).

The federal government recently announced a $35 million support for Toyota Australia to produce a hybrid Camry at its Altona plant from 2010. The Victorian government also announced its support of the car's production with the commitment to purchase 1,000 vehicles each year. This direct support is additional to but dwarfed by $5 billion aid to the motor vehicle assemblers and components manufacturing industry from the Automotive Competitiveness and Investment Scheme (ACIS) from 2001 to 2015.

Direct Federal government subsidies to the automotive industry are delivered through a range of schemes such as ACIS, the Cooperative Research Centre for Advanced Automotive Technology, fringe benefit tax concessions (foregone taxation revenue) for company cars, imported vehicle tariffs, LPG vehicle scheme and the recently announced $500 million Green Car Innovation Fund. However, globally the automotive industry is in decline suffering from massive over capacity and in Australia the industry has lost at least 7,500 jobs over the last five years.

The Victorian government motor vehicle policy mandates the purchase of locally made vehicles and in one direct intervention, in March 2008 the state government contributed to the upgrading of the Anglesea car test track.

Future directions on climate change include positioning Victorian industry to capitalise on the new jobs, new technologies, innovation and investment, improving resilience by keeping jobs and investment in engineering and manufacturing industry.

Local rolling stock manufacturing needs an emphasis on local purchasing to improve the local business case, smooth out lumpy procurement decisions, improve its skills attractiveness and with the additional benefit of economies of scale, become globally competitive. The motor vehicle industry is an example of how with positive support, local manufacturing has moved from rust-belt status to become a globally competitive industry in component and vehicle design, using advanced manufacturing technologies and supplying a globally competitive product.

Both state and federal governments have demonstrated their willingness to direct large amounts of support to automotive manufacturing in Australia. A similar commitment to the railway equipment industry is needed to support manufacturing to address climate change and open new prospects for innovators and entrepreneurs.

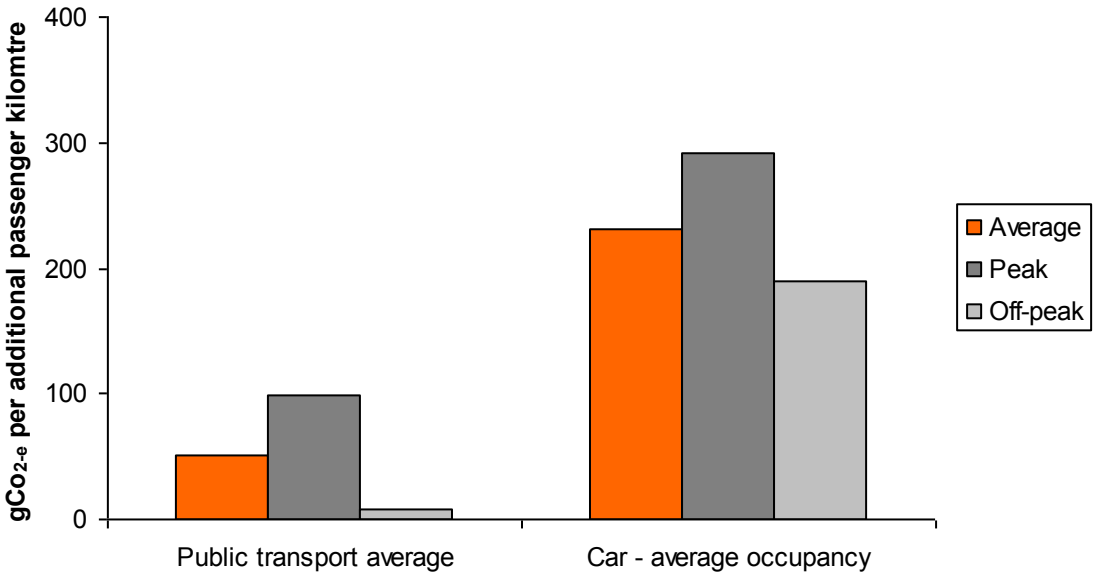
2 Supporting an ETS with complementary measures

2.1 Pricing and demand management

Although the Commonwealth Government's recent green paper outlining a design for an Emissions Trading Scheme proposes the inclusion of transport within coverage of the scheme, it also proposes to offset any resulting increase in the price of petrol during the first three years by reducing fuel excise (Department of Climate Change 2008, p.100). This effectively means that road transport will not be subject to carbon pricing until 2013, while electrified public transport will be subject to carbon pricing at the outset. As a result households and businesses will have no effective incentive to make decisions that will reduce transport emissions and prepare for a carbon constrained future, and may in fact face incentives to shift away from public transport.

This is clearly a deeply perverse outcome that will require strong countervailing measures by all tiers of government. In the absence of carbon pricing over the short-term to influence decisions, demand should instead be restrained by placing a moratorium on the addition of new road capacity and by reallocating existing capacity to more sustainable modes to encourage a modal shift to active transport and public transport. As noted by the Commissioner for Environmental Sustainability, "[t]o reduce emissions, the increase in public transport must be matched by a decrease in car usage" (CES 2008, p.20).

Figure 2.1: Comparative incremental GHG emissions



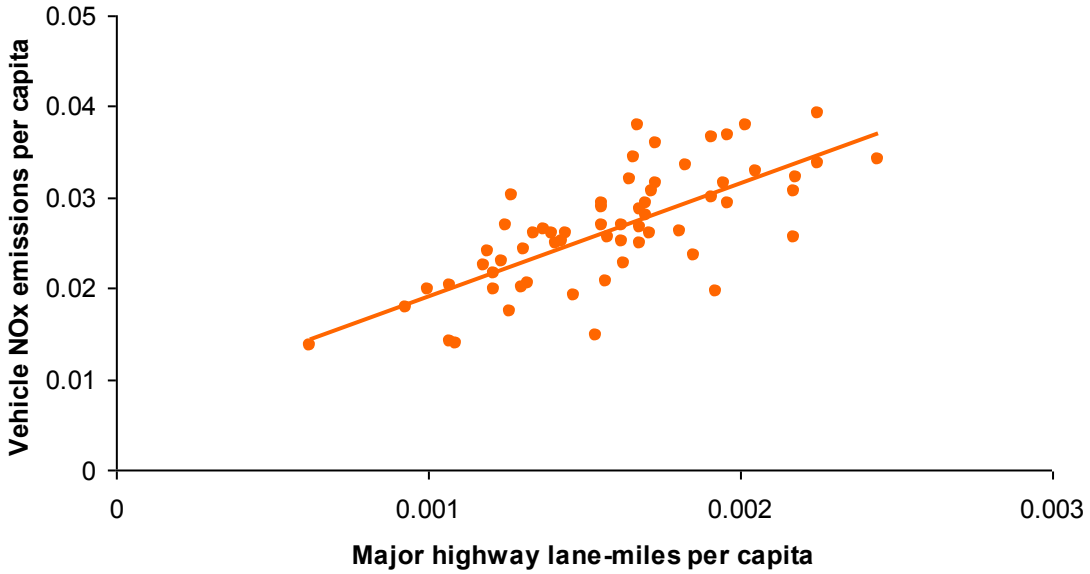
Source: McCarthy 2007

International experience demonstrates that road capacity reduction can be effective in reducing demand for travel by private car, especially where transport alternatives are of good quality (Goodwin 2007, pp.413-414). This is effectively the reverse of 'induced traffic' that follows road capacity expansion and that defeats attempts to reduce congestion and emissions through road

building (Litman 2007; PTUA 2008a, pp.22-25). Since carbon pricing is not being used as a demand management or 'carbon rationing' tool for road transport in the near term, the role of rationing by queuing must be expanded by actively restricting the supply of road capacity available to private transport.

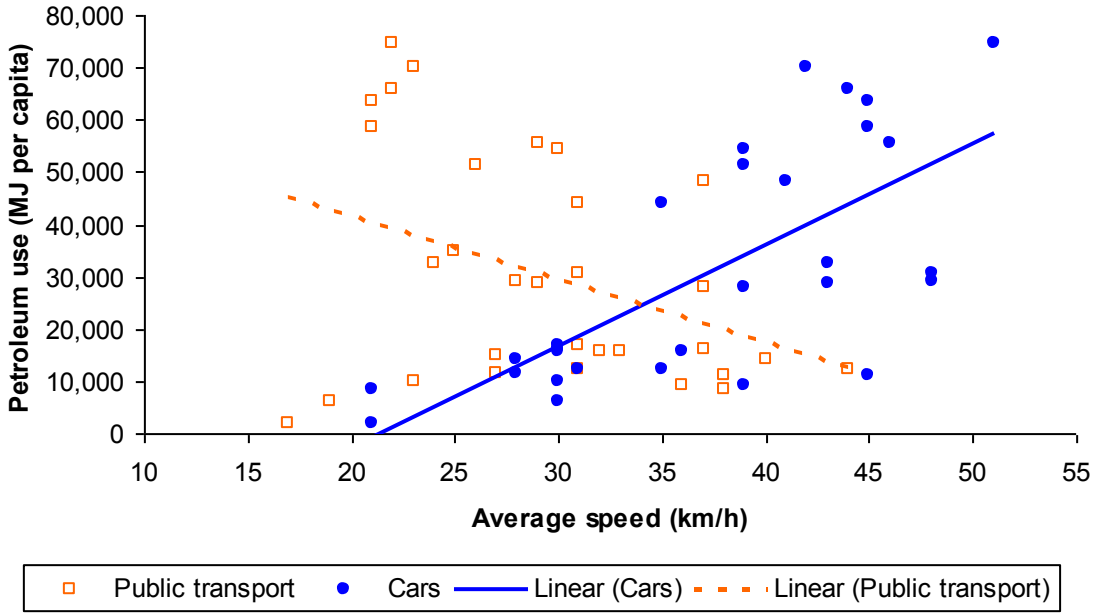
Although it is often claimed that eliminating traffic bottlenecks and reducing congestion will improve traffic flow and thereby reduce fuel consumption and emissions, such claims ignore the additional or 'induced' traffic that results (Litman 2007). Not only does roadway expansion lead to traffic and emissions growth, it diverts resources from measures that are needed to achieve more significant and longer-lasting emissions reductions, such as improved public transport and rail freight infrastructure.

Figure 2.2: Road supply and transport emissions



Note: Cities with higher levels of road infrastructure provision have higher levels of transport emissions.
Source: Cassady et al 2004

Figure 2.3: Average transport speeds and fuel use



Note: Cities with higher average traffic speeds consume much more petrol than cities with slower traffic. By contrast, cities with faster public transport use less petrol than cities with slow public transport.
Source: Newman & Kenworthy 1989

The inclusion of transport in the scope of the ETS means that carbon pricing can be expected to increase the cost of transport fuel in the longer term (post-2012), and that this will have the effect of moderating demand for road transport. This reinforces the need to suspend expansion of road capacity over the next few years to prevent possible over-investment in road infrastructure at a time when public transport and various non-transport sectors are suffering from under-investment.

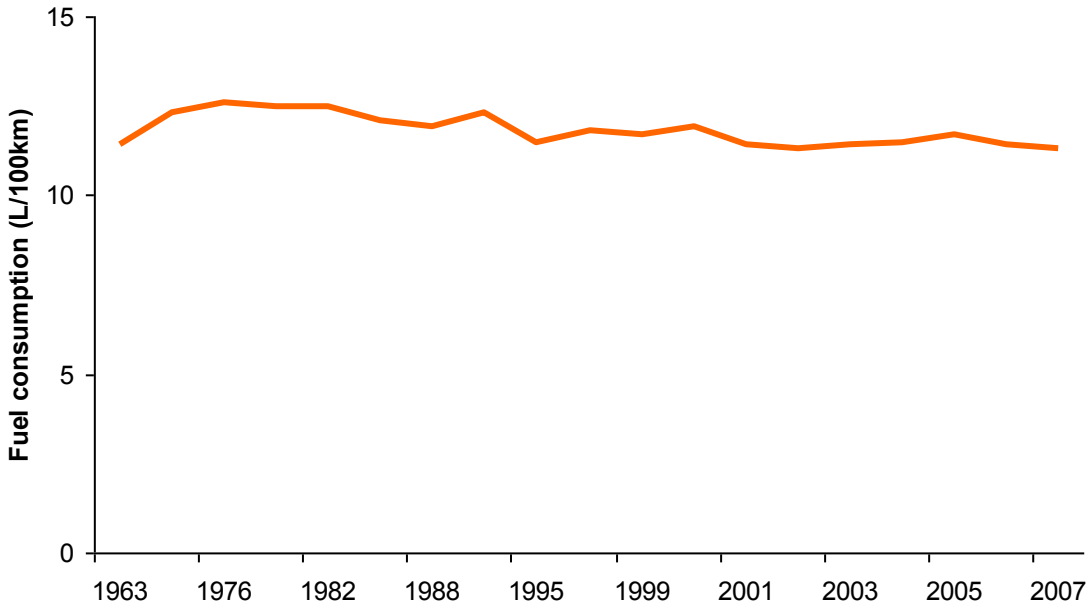
2.2 Vehicle efficiency

While improved vehicle efficiency will be an important contributor to emissions reductions, it is important to recognise the limitations of technical efficiency. Analysis by the CSIRO of complementary measures including mandated improvements in vehicle fuel efficiency "highlighted a significant rebound effect that, if not overcome, could render the policies ineffective in achieving some policy goals" (Future Fuels Forum 2008, p.23). In other words, unless demand for car travel is actively restrained, the increased amount of driving resulting from lower per kilometre fuel costs will push transport emissions upwards, and potentially even higher than they would be in the absence of such complementary measures (*op cit*, p.22). Of the measures modelled by CSIRO, higher fuel excise was more effective at reducing aggregate emissions than measures directly focussed on improving vehicle efficiency.

Despite decades of technical advances, the average fuel consumption of cars on Australian roads is virtually unchanged from half a century ago. A significant factor behind this lack of progress is the increasing bulk of passenger vehicles as consumers seek heavy and energy-sapping accessories like air conditioning, and the desire for large four wheel drives and 'Sports Utility Vehicles' (SUVs). The growing number of large passenger vehicles, which are more likely to be involved in serious

accidents (Newstead *et al* 2000), is contributing to an on-road arms race as more people seek larger, heavier cars for the perceived protection they offer from other road users.

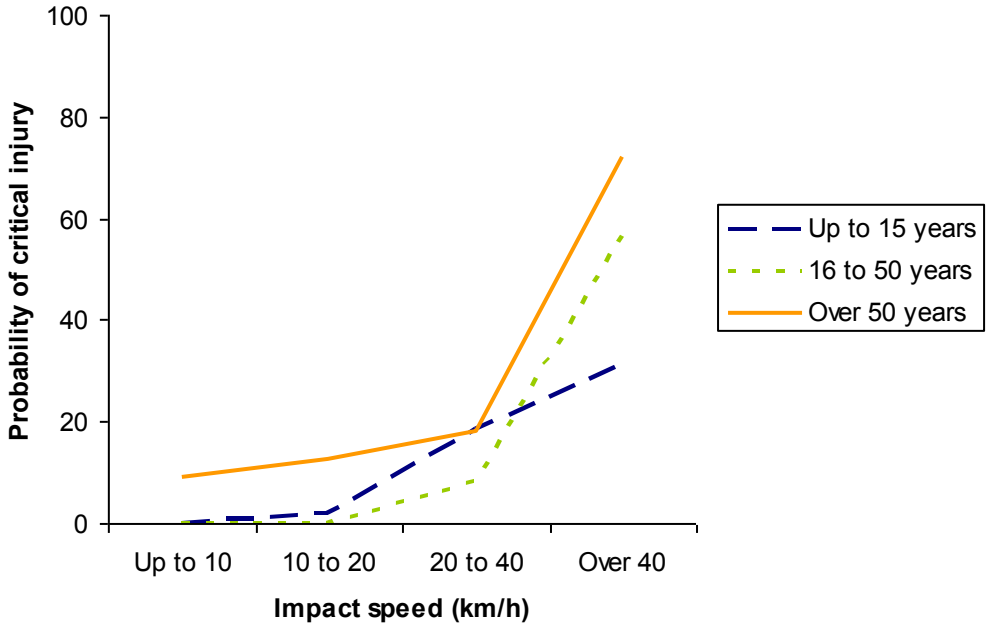
Figure 2.4: Average passenger car fuel consumption 1963-2007



Source: Australian Bureau of Statistics Survey of Motor Vehicle Use

A key requirement for significant improvements in vehicle efficiency will be reducing vehicle size and weight (Moriarty & Honnery 2007). However, consumer acceptance of such vehicles will be limited while ever there are concerns about the damage to life and property that can be inflicted by *other* vehicles on the road. Reduced speed limits can reduce the frequency and severity of vehicle collisions, and in doing so increase the acceptability of smaller motor vehicles to consumers. Lower traffic speeds also reduce the probability and severity of injuries to pedestrians and cyclists, thus making zero carbon options such as walking and cycling more attractive. A core part of reducing transport emissions should therefore be improving safety for more vulnerable road users by restraining traffic speeds, including suspending the construction of high speed roads such as freeways.

Figure 2.5: Probability of injuries being critical by impact speed and age of pedestrian



Source: Tharp 1976

The cost effectiveness of reliance on large improvements in car technical efficiency is also questionable. Increased technical efficiency comes at a cost - the higher the efficiency, the higher the cost (Weiss *et al* 2000; McManus & Jean 2008). This can include costs to taxpayers for government handouts to the automotive industry for research, development and commercialisation, and higher costs to consumers to acquire, finance and maintain more efficient vehicles (noting that these standing costs can be substantially greater than fuel costs). When such costs are considered, it is often more cost effective to reduce car dependence and vehicle use rather than per kilometre fuel consumption.

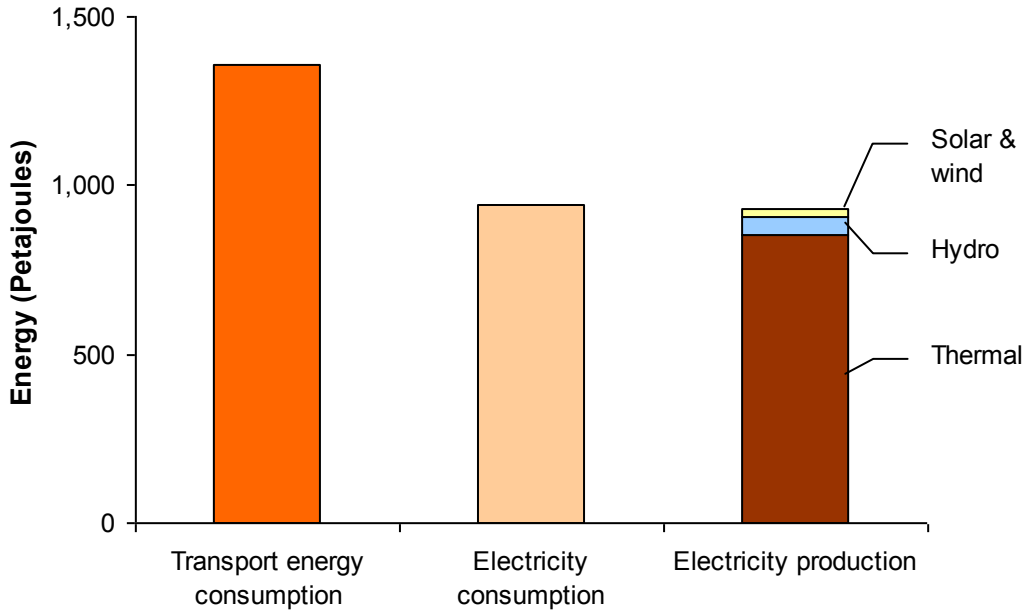
While there are numerous enthusiastic advocates of focussing on technical efficiency ahead of behaviour change and *systems* efficiency, the potential of cost-effective technical efficiency is much less impressive. Weiss *et al* (2000) estimate that doubling fuel efficiency would add about 20% to the cost of cars while the US National Research Council found that cost effective improvements possible in the next 10 years may only increase efficiency by 1-15% (National Research Council 2002). When the limits to cost effective technical efficiency are considered in the context of the rebound effect mentioned above, it is patently clear that greater *systems* efficiency and large modeshift away from private vehicles will be necessary to achieve the required reductions in emissions (PTUA 2008a, pp.12-17).

2.3 Alternative fuels

It would also be a mistake to assume electric or hydrogen-powered cars are necessarily low or zero emissions vehicles. Hydrogen production remains largely fossil fuel-based and the carbon intensity of electricity generation in Victoria is among the highest in the world. Adding transport energy requirements to this could represent about a doubling of electricity consumption (Figure 2.6). The

task of decarbonising the stationary energy sector is already large enough without doubling the size of that task.

Figure 2.6: Transport energy consumption and electricity production and consumption in Australia (2006-07)



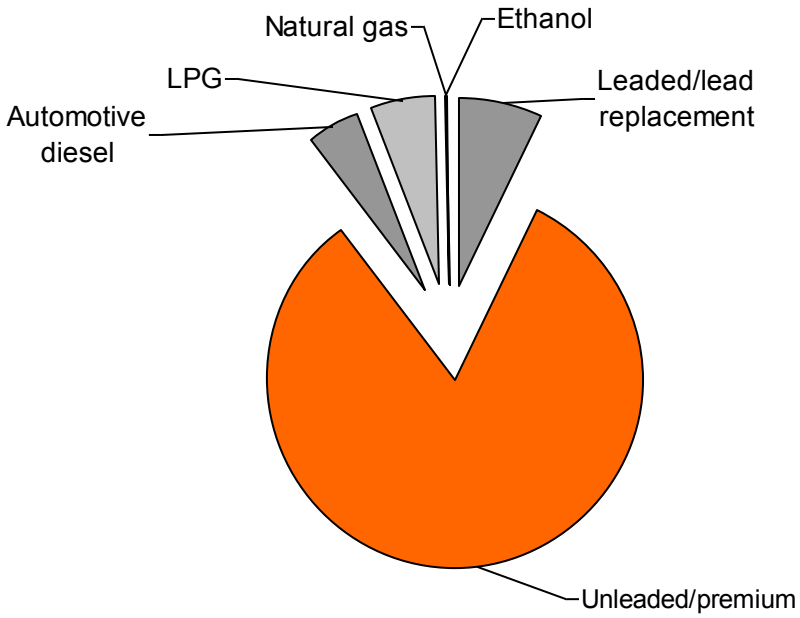
Note: Thermal electricity production includes coal, petroleum, gas and biomass.
Source: ABARE 2008

A number of recent reports have also demonstrated that biofuels will be of limited benefit. It is now clear that the rush to ethanol and biodiesel has contributed to:

- rapid escalation in food prices (Quiggin 2007; Mitchell 2008);
- large scale deforestation (Naylor et al 2007);
- dislocation of vulnerable communities and human rights abuses (Oxfam 2007; Doyle 2008); and
- poor utilisation of taxpayers' funds for minimal greenhouse benefits (Doornbosch & Steenblik 2007; OECD 2008).

Rather than pursuing a false cornucopia of biofuel with subsidies, tax concessions and blending mandates, greater attention should be focussed on reducing the need for liquid fuel by expanding the role of efficient public transport, including electrified rail. To the extent biofuel is produced, it should be subject to strict social and environmental certification to ensure negative impacts are minimised and greenhouse gas reductions across the full life cycle can be verified.

Figure 2.7: Share of car energy consumption (2004)



Note: Ethanol production would have to increase by orders of magnitude to make a significant contribution to current levels of transport energy consumption. This is extremely unlikely to be either cost-effective or sustainable.
Source: Bureau of Transport and Regional Economics

The limited scalability of biofuel and large quantity of transport energy consumption leads us to believe that non-conventional oil is the more likely candidate to make up the growing shortfall between conventional oil supply and projected transport energy demand. This would have dire implications for the climate since non-conventional oils such as shale oil, tar sands and coal-to-liquids result in much higher carbon emissions for each unit of final energy (Farrell & Brandt 2006; Brandt & Farrell 2007) and would guarantee that dangerous climate change takes place. The only defensible response is to simultaneously strive for much greater transport *systems* efficiency and decarbonisation of transport energy supplies.

2.4 Public transport

Greater use of public transport would also provide a wide range of benefits including reduced congestion, reduced road trauma and improved mobility for non-drivers and other transport disadvantaged groups. These sorts of benefits mean that environmental benefits such as emissions reductions are provided for free (Litman 2008a; PTUA 2008a, pp.36-37). The economic and employment impact of consumer expenditure on public transport is also more significant than expenditure on petroleum and general automotive expenditure which are capital intensive and have a large proportion of imported content (Litman & Laube 2002). For example, a study in Texas found that each 1% of travel that was shifted from car to public transport would increase income in the region by $2.9 million and create an extra 226 jobs (Miller *et al* 1999).

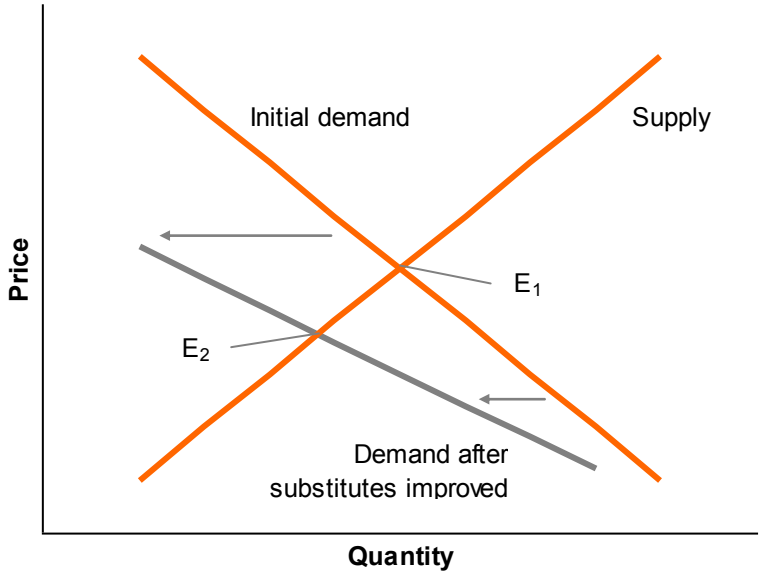
The scale and urgency of the task of reducing emissions provides ample justification for adopting additional measures beyond the introduction of an ETS (especially since road transport is effectively exempted for the first three years). For example, the barriers to increased modeshare for

public transport and cycling largely relate to non-cost factors that will not be directly affected by carbon pricing (PTUA 2008a, pp.28-33). Individuals also have little direct influence over these non-cost factors and rely upon government planning to deliver services that meet their needs. The quality of transport planning and service provision, which is largely outside the direct influence of an ETS, is therefore crucial to cost-effective emissions reductions in the transport sector.

Travel behaviour is largely influenced by the 'generalised cost of travel' which includes the time cost as well as direct financial costs such as fuel and other running costs. The time component of the generalised cost is often the dominant factor, especially for people in areas that are not well-served by public transport. Public transport needs to offer time-competitive journey times if it is to be a viable alternative for people wishing to reduce their motor vehicle use.

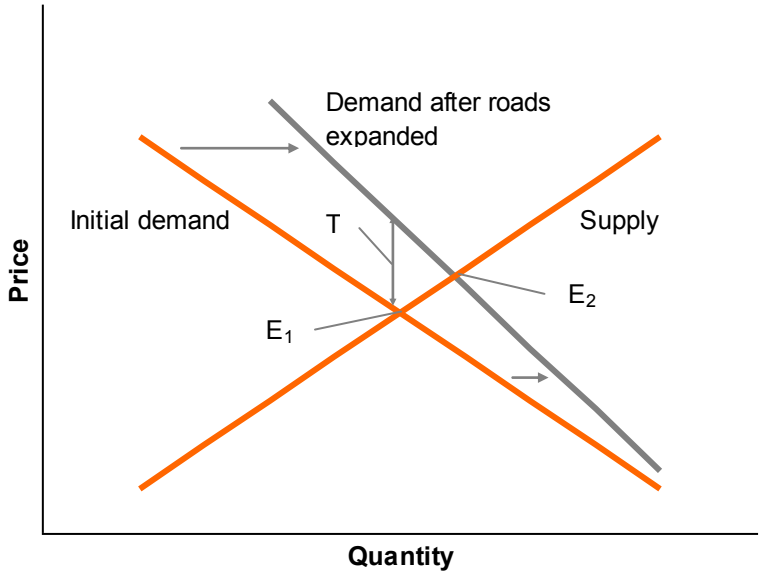
Enhanced public transport would leverage the effectiveness of carbon pricing, increasing the price elasticity of petrol demand for consumers by making substitutes to car use more attractive (Figure 2.8). This is to be contrasted with expanding road networks which would encourage greater motor vehicle use and fuel consumption (Figure 2.9).

Figure 2.8: Impact on fuel demand of improving substitutes to car use



Prior to improvements being made to public transport, fuel demand and supply are in equilibrium at E_1. After public transport is improved, the demand curve for fuel becomes more elastic and shifts to the left. A new equilibrium is established at E_2 with lower fuel consumption (and emissions) and lower fuel prices (inclusive of carbon price).

Figure 2.9: Impact on fuel demand of improving roads



Prior to improvements being made to roads, fuel demand and supply are in equilibrium at E_1. After roads (a complement to fuel) are improved, the demand curve for fuel becomes more inelastic and shifts to the right. A new equilibrium is established at E_2 with higher fuel consumption (and emissions) and higher fuel prices. An additional carbon price of T would be required to lower emissions to their initial level at E_1.

2.4.1 Key success factors for public transport

While 'improving public transport' is somewhat of a motherhood statement, the practical measures to promote public transport are outlined below (PTUA 2008a, pp.28-34).

2.4.1.1 Safety

Fear of physical assault deters many people from using public transport, especially off-peak when major reductions in emissions can be achieved from modeshift away from private cars (Figure 2.1). Passenger safety can be improved by the presence of staff on public transport vehicles and at transport interchanges, as well as the adoption of crime prevention through environmental design (CPTED) or 'design out crime' principles around transport interchanges and along walking and cycling routes.

2.4.1.2 Comfort

Comfort includes factors such as crowding, availability of seating, smoothness of ride, cleanliness, noise and exhaust emissions, protection from the weather and the standard of customer service. Providing acceptable levels of comfort will be important in attracting people out of cars and onto public transport (Ceder 2004; Mann & Abraham 2006).

2.4.1.3 Accessibility

People must have actual and perceived access to public transport if they are to use it. This requires good service coverage and effective integration between transport and land use planning.

2.4.1.4 Reliability

Poor service reliability will deter many people from using public transport. Service reliability can be enhanced by fully separated rights of way, traffic light priority and headstart lanes.

2.4.1.5 Cost

To attract discretionary journeys, public transport must be able to compete with the marginal cost of car use which excludes fixed or periodic costs such as financing, registration, depreciation and maintenance. Fares should also be multimodal to ensure the network effect of an integrated system is not undermined.

2.4.1.6 Efficiency

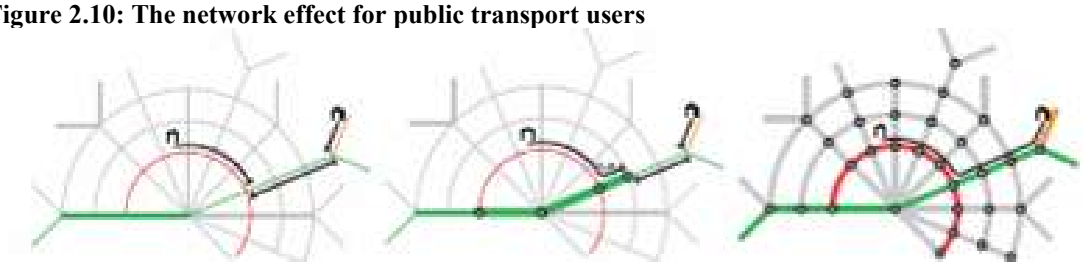
To attract users, public transport journey times (including waiting and connection times) must be competitive with car use. Rail services offer the most competitive travel speeds (Table 2.1), however frequencies should be high for all services to ensure an effective network effect is established that allows travel to a diverse range of destinations (Figure 2.10).

Table 2.1: Comparative speed of road traffic and public transport

	Melbourne	Sydney	Brisbane	Perth
Average road network speed (km/h)	43	36	50	46
Average road-based public transport speed in km/h (% of road network speed)	21 (49%)	21 (58%)	27 (54%)	25 (54%)
Average segregated rail transport speed in km/h (% of road network speed)	40 (93%)	47 (131%)	48 (96%)	50 (109%)

Source: Scheurer et al 2005

Figure 2.10: The network effect for public transport users



An unlinked collection of low-frequency routes (a non-network)
The area you can reach by a simple journey is restricted to walking distance from your closest line. Users need to have detailed information about timetables.
Transferring is difficult and crossing points have little value.

Some high-frequency services
Good service along high-frequency lines makes some transfers more attractive, but only in the direction towards the high-frequency service.
Increased frequencies on the best sections will do little to improve general conditions.

The full network effect
Many lines operating at high frequencies, or with coordinated timetables, create a network.
In the same way that motorists use intersecting roads, travellers can go anywhere, anytime.
Transfers open up many travel options.

Source: HiTrans 2005; Stone 2007

3 Cost-effective measures in sectors outside the ETS

Responding to this section is complicated by the fact that the details of the Commonwealth Government's Carbon Pollution Reduction Scheme are yet to be finalised, however we note that the Commonwealth Government's Green Paper proposes transport be included. We believe the inclusion of transport in the CPRS is appropriate due to the level and growth of transport-related emissions (PTUA 2008a, pp.3-11) and the generally accepted principle that coverage should be as broad as possible to ensure an effective and efficient scheme.

3.1 Offsets

One of the key techniques for pursuing emissions reductions in sectors outside an ETS is through carbon offsets. While offsets may have a role as part of the transition to a post-carbon economy, we also note that carbon offsets have a number of potentially serious drawbacks and cannot substitute for genuine measures to reduce emissions in the first place.

3.1.1 Permanence

To be effective, an offset must result in a *long-lasting* reduction in atmospheric greenhouse gas concentrations. One of the most common offsets is the use of trees as a carbon sink. Climate change is putting ecosystems under increased stress through higher temperatures, reduced water availability and increased prevalence of drought, thus reducing the take up of carbon by plants. Together with increased frequency and severity of bushfires, projected levels of climate change could cause trees planted under offset schemes to release carbon back into the atmosphere in a relatively short timespan.

In this context we note the greater effectiveness of natural forests in sequestering carbon (Mackey *et al* 2008).

3.1.2 Additionality

To be of value, an offset must reduce atmospheric greenhouse gas concentrations below the level they would have been at in the absence of the offset. There are many international examples of offsets or credits being claimed for measures that would have taken place either way, meaning that no additional greenhouse gas reductions were achieved.

Rising oil prices are providing many with an incentive to reduce transport fuel consumption on one hand, while on the other hand the oil industry is pursuing Enhanced Oil Recovery techniques which often involve the injection of carbon dioxide into oil reservoirs. In such cases, the greenhouse gas reductions are not additional, and should not be regarded as an offset.

3.1.3 Scalability

The scalability of offset schemes based on planting trees is limited by the availability of suitable land, meaning this can only ever cater for a tiny proportion of emissions. In addition, it is expected that opportunities for additional emissions reductions will become limited as energy production is decarbonised and energy conservation and efficiency measures become ubiquitous. The resulting tight supply of offset opportunities could make offsets unaffordable for many people.

These drawbacks emphasise the need to enable the adoption of low carbon lifestyles to ensure households are not left vulnerable to an escalation in the cost of carbon emissions.

4 Security, efficiency & affordability of energy

Energy affordability is a function of both price and the level of energy consumption (price x quantity = cost). Sustainability, security and affordability objectives can be achieved simultaneously by focussing greater attention on the 'quantity' part of the equation and reducing the energy requirements of households and businesses. In contrast, constantly dwelling on the 'price' part of the equation undermines sustainability objectives and thereby has more serious negative impacts on vulnerable groups over the medium to longer term.

As one of the largest consumers of energy in Australia, the reduction of energy use in the transport sector must be a priority to ensure energy security and affordability. This requires much greater transport *systems* efficiency which entails a large reduction in private vehicle use and greater use of ICT, walking, cycling and public transport. The means to achieve this are discussed elsewhere.

5 Assisting households to adjust

The continued strong upwards trend in global oil prices has focussed renewed attention on the impact of rising petrol prices on Australian households. There is little doubt that rising petrol prices are contributing to significant financial stress in households without transport alternatives, however it is also the case that the majority of fuel is purchased by upper and middle income households (Figure 5.1) in capital cities and other urban areas (Figure 5.2). Trying to keep the cost of petrol low in general would therefore contradict the emissions reduction objectives of carbon pricing and ensure that most of the benefits would go to those who need it least. Furthermore as noted above, fuel excise can be one of the most effective measures to reduce transport emissions (Timilsina & Dulal 2008, pp.11-17; Future Fuels Forum 2008, pp.22-23).

Unlike petrol consumption, an established system of concession fares makes it easy for government to target support to low income users of public transport. Concession fares mean that many people on low incomes spend a lower proportion of household expenditure on public transport relative to their actual use of the system. This can be an important means of assisting vulnerable groups to adjust to a carbon constrained world, and availability of good quality public transport must be expanded to ensure more Victorians have a genuine option of utilising such services.

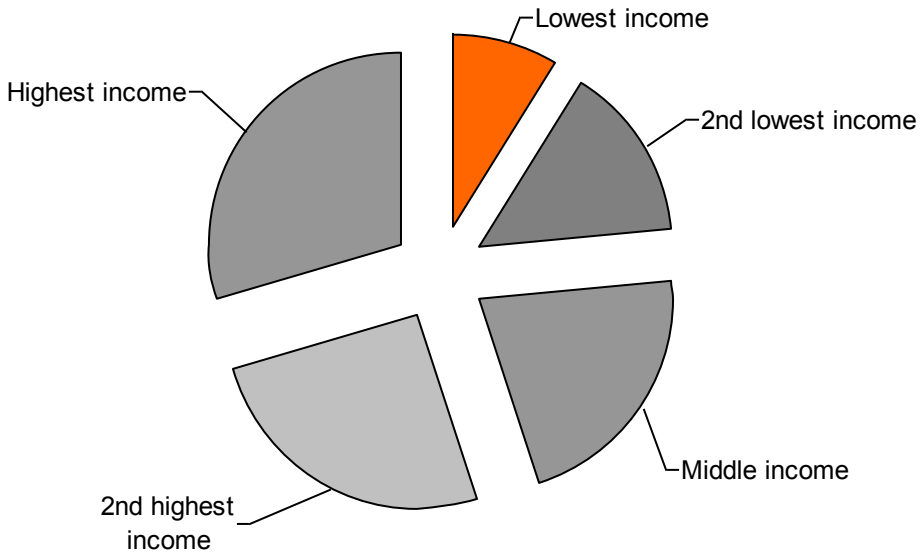
Regulatory and/or consumer demand for greater vehicle efficiency will also push up the price of motor vehicles, making them more expensive to buy and finance, as discussed above. Despite high petrol prices, vehicle finance costs can already be two to five times greater than fuel costs (RACV 2008). Owners of hybrid or electric vehicles may also face large maintenance costs to replace battery systems. These less obvious costs will add to the financial stress imposed by 'forced car ownership', even if fuel expenditure does not increase in real terms. For many people a more cost-effective response will be to own fewer cars and make more use of walking, cycling and public transport (if available).

Many people indicate a willingness to switch to public transport in response to high fuel prices but express frustration with the lack of adequate services in the area (e.g. Dowling 2008). It is therefore important not to simply 'encourage' a reduction in car use, but to **enable** it with significant improvements to public transport and facilities for walking and cycling. A key part of this is expanding the coverage of time-competitive public transport services that meet the needs of modern lifestyles.

The federal government also has an important role to play in assisting households to adjust. Federal investment in urban and regional public transport infrastructure should be boosted significantly to expand the availability of affordable transport alternatives, and expansion of road capacity suspended to prevent exacerbation of transport and landuse patterns that will intensify financial stress in a carbon-constrained world.

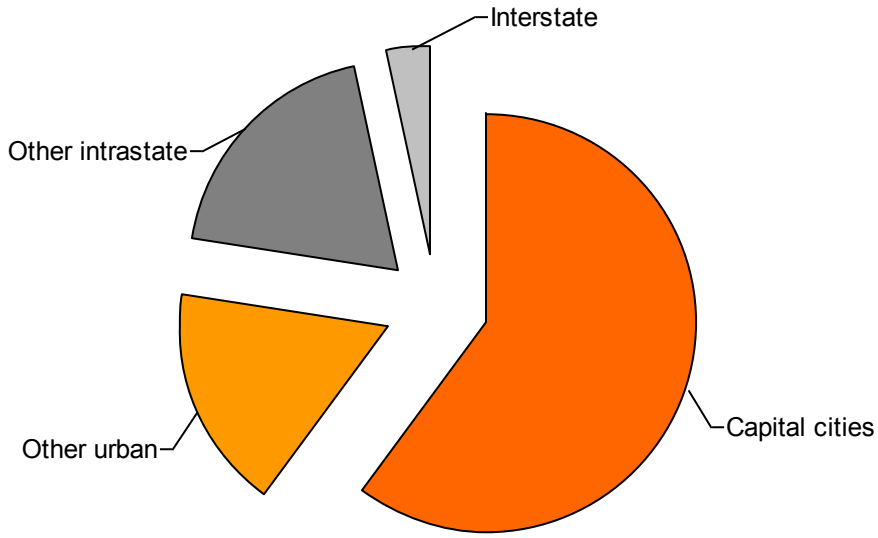
The federal government should also be encouraged to recognise the specific challenges faced by rural communities who currently lack transport alternatives. Not only could the ETS provide revenue for ensuring access to transport in rural and remote communities and financial support for vulnerable groups, the federal review of Australia's Future Tax System could explore how the federal transfers system might ameliorate declining transport affordability in rural areas while still supporting the emissions reduction objectives of carbon pricing.

Figure 5.1: Weekly expenditure on fuel by household income



Source: ABS Household Expenditure Survey 2003-04 (ABS 2006b)

Figure 5.2: Location of passenger vehicle use



Source: ABS SMVU year ended 31 Oct 2006 (ABS 2007)

6 Increasing knowledge about climate change

Assessment Reports from the Intergovernmental Panel on Climate Change (IPCC) arguably provide the most comprehensive and rigorous compilations of knowledge about climate change. The IPCC's extensive (and sometimes politicised) review processes are aimed at ensuring their Assessment Reports present incontrovertible science, however the resulting delays and scientific conservatism mean that climate science has frequently moved on by the time reports are published (Adam & Traynor 2007; Zarembo & Maugh 2007; Hansen 2007).

Emerging science paints a picture of a world that is warming more quickly than expected and ecosystems that are undergoing more rapid change and experiencing greater stress than expected (Spratt & Sutton 2008). Climate policy must recognise this more recent science and respond accordingly.

The extent of future sea level rises is one area that appears particularly prone to understatement. For example, the Summit Paper (p.5) makes the common error of adopting a projection of an increase in sea levels of less than a metre by the end of the century when in reality the IPCC's final report in 2007 explicitly stated that "this report does not assess the likelihood, nor provide a best estimate or an upper bound for sea-level rise" and that "the upper values of the ranges are not to be considered upper bounds for sea level rise". When climate-carbon cycle feedbacks and more recent evidence on ice cap responsiveness to warming are incorporated, sea level rises amounting to several metres by the end of the century are seen to be more likely (Hansen 2007; Spratt & Sutton 2008).

The increased awareness of the proximity and implications of "tipping points", such as Arctic sea ice loss, now demands an urgent and honest reappraisal of emissions reductions targets and trajectories.

7 Increasing resilience of regions & communities

Australia has a great deal to lose from climate change, and the negative impacts on Victorian communities are potentially among the most severe, including greater exposure to drought and bushfires (Garnaut Climate Change Review 2008, CSIRO & BOM 2007). Victoria's population is also heavily concentrated in coastal cities and communities that are vulnerable to rising sea levels (Hansen 2007). Victorian communities are therefore best served by serious efforts to reduce emissions to prevent runaway climate change.

Emerging research indicates the importance of 'self-resilience' in a community when confronting disasters. This self-resilience is aided by frank and open dialogue between technical experts and officials and local community members. Effective climate change mitigation measures will only be possible if communities are fully appraised of the scale and speed of emission reductions required (Spratt & Sutton 2008, pp.172-175), and thereby empowered to take whatever actions are necessary to ensure a safe climate. For this reason, a more brutally honest public education campaign appears to be warranted - more akin to a graphic TAC road safety advertisement than the less confronting black balloons campaign.

The ability of people to engage in their communities in an era of carbon constraints would also be aided by strengthening low carbon transport alternatives. Similarly, the ability of regional businesses to participate in the broader Victorian, national and international economy would be strengthened by low carbon distribution channels. Both of these objectives would be aided by rebuilding Victoria's regional rail network to expand the coverage of regional rail services and increase the efficiency of rail freight services. It is also important, however, to ensure local public transport services are well integrated with intercity services.

8 Assisting natural assets & ecosystems to deal with pressures

Climate change will place substantial stress on natural ecosystems. The ability of natural systems to survive these pressures is compromised by fragmentation of ecosystems and expansion of human settlements and activities across a wider area.

Biofuel production is contributing to substantial habitat loss through deforestation to make way for the growing of biofuel crops or for other crops displaced from elsewhere by biofuel crops (Naylor *et al* 2007). To minimise this destruction of natural assets within Victoria and internationally, there is a pressing need for robust and comprehensive life cycle analysis of biofuels including independent social and environmental certification building upon the experience of California and the European Union in this area.

There is also a need to guard against land use changes resulting from urban sprawl and the fragmentation of natural systems by roads. A strengthening of the roles of walking, cycling and public transport and a moratorium on the expansion of the capacity of the road network are important tools to protect natural systems.

9 Supporting Victorians to get active on climate change

Community involvement in infrastructure investment and decisions would be greatly aided by incorporating community-based transport planning within a transportation authority based upon the 'transport community' model originating in Europe and now gaining popularity in jurisdictions across the world including the UK, North America and other Australian states (PTUA 2008b).

Institutionalising community engagement and participation in transport decision making in this way would ensure more informed public contributions to discourse on transport policy, and ensure planning and investment decisions have broader and more soundly based support.

10 Ensuring Victoria plays a proactive role in global efforts

10.1 Leading by example

There is no denying that a serious and shared commitment among all nations will be required to adequately reduce emissions, and that no single national or sub-national government can prevent dangerous climate change on its own. However, commitment to ambitious emissions reductions is unlikely to come from lower income countries with lower per capita emissions unless wealthy and technologically advanced nations such as Australia get their own house in order.

Victoria could play a positive role in efforts to address climate change by leading by example in making deep and rapid cuts in greenhouse emissions. There has been acknowledgement for some time by government in Victoria that this means reductions of at least 75% (DSE 2005, p.6). More recent science demonstrates that high per capita polluters such as Victoria must target even larger cuts sooner. We hope therefore that the forthcoming Climate Change White Paper puts substance to these words from the Premier and Minister for Environment and Climate Change in the Foreword to Summit Paper:

> ***"we have the political will to deliver"***

10.2 Supporting local government

Local government also has an important role to play in reducing emissions, including in the transport sector. Local government has a lead role in providing a comprehensive and safe network of pedestrian and cycle routes linking residential and commercial areas with each other and with transport interchanges such as railway stations. Local government can also help to ensure the efficient operation of public transport by implementing priority measures for road-based public transport and administering public transport guidelines for land use development.

The state government can assist local government in these responsibilities by supporting local government initiatives that encourage a shift from private motor vehicles to walking, cycling and public transport use. This support must also include endorsing local traffic restraint measures rather than adopting an oppositional stance.

Resource constraints in local government could also be ameliorated by providing incentive payments to councils that successfully implement local sustainability programs, possibly modelled on the National Competition Policy payments made to state governments by the Commonwealth. For example, local governments that successfully achieve appropriate benchmarks for combined modeshare for active transport and public transport in their LGA could receive 'Local Sustainability Policy payments' from the state and/or federal government.

11 References

ABARE, 2008, *Energy Update 2008*, Australian Bureau of Agricultural and Resource Economics, Canberra, http://www.abareconomics.com/interactive/energyUPDATE08/

ABS 2006b, *Household Expenditure Survey, 2003-04*, Australian Bureau of Statistics, Canberra,

ABS 2007, *Survey of Motor Vehicle Use*, Australian Bureau of Statistics, Canberra,

Adam, D. & Traynor, I., 2007, 'Scientists' stark warning on reality of warmer world', *The Guardian*, 7 April, available at: http://environment.guardian.co.uk/climatechange/story/0,,2051915,00.html

Brandt, A. & Farrell, A., 2007, 'Scraping the bottom of the barrel: greenhouse gas emission consequences of a transition to low-quality and synthetic petroleum resources', *Climatic Change*, Vol. 84, Nos. 3-4, pp.241-263, doi: 10.1007/s10584-007-9275-y

Cassady, A., Dutzik, T. & Figdor, E., 2004, *More Highways, More Pollution*, Environment California, http://www.environmentcalifornia.org/uploads/DT/xt/DTxtE1628jWJvtqR5OkNng/More_Highways_More_Pollution.pdf

Ceder, A., 2004, "New Urban Public Transportation Systems: Initiatives, Effectiveness and Challenges", *Journal of Urban Planning and Development*, Vol. 130, No. 1, pp.56-65

CES, 2008, *Public transport's role in reducing greenhouse emissions*, Commissioner for Environmental Sustainability, Melbourne, http://www.ces.vic.gov.au/CA256F310024B628/0/3C375AF544CFB3D4CA25748D0022100E/$File/Public+transport+role+in+reducing+greenhouse+emissions.pdf

CSIRO & BOM, 2007, *Climate change in Australia: technical report 2007*, CSIRO, http://www.climatechangeinaustralia.gov.au/resources.php

Department of Climate Change 2008, *Carbon Pollution Reduction Scheme Green Paper*, Department of Climate Change, Canberra, http://www.climatechange.gov.au/greenpaper/report/pubs/greenpaper.pdf

Doornbosch, R. & Steenblik, R., 2007, *Biofuels: Is the cure worse than the disease?*, Organisation for Economic Co-operation and Development, Paris

Dowling, J., 2008, '20% dump car for public transport', *The Age*, 29 July, http://www.theage.com.au/national/20-dump-car-for-public-transport-20080728-3mb6.html

Doyle, A., 2008, *Climate Solutions Often Harm Indigenous Peoples - UN*, Reuters, 3 April, http://www.planetark.com/dailynewsstory.cfm/newsid/47753/story.htm

DSE 2005, *Victorian Greenhouse Strategy Action Plan Update 2005*, State of Victoria Department of Sustainability and Environment, Melbourne

Farrell, A. & Brandt, A., 2006, 'Risks of the oil transition', *Environmental Research Letters 1*, doi:10.1088/1748-9326/1/1/014004, http://www.iop.org/EJ/article/1748-9326/1/1/014004/erl6_1_014004.pdf?request-id=4eca931b-03ef-496a-943d-08ea19d84785

Future Fuels Forum, 2008, *Fuel for thought*, Commonwealth Scientific and Industrial Research Organisation, http://csiro.au/files/files/plm4.pdf

Garnaut Climate Change Review, 2008, *Draft Report*, July, Commonwealth of Australia, Canberra, http://www.garnautreview.org.au/CA25734E0016A131/pages/draft-report

Goodwin, P., 2007, 'Effectiveness of Transport Policies in Reducing Car Travel', in Gärling, T. & Steg, L., *Threats from Car Traffic to the Quality of Urban Life*, Elsevier, Oxford

Hansen, J. 2007, 'Scientific reticence and sea level rise', *Environ. Res. Lett. 2* (April-June 2007) 024002 doi:10.1088/1748-9326/2/2/024002

HiTrans, 2005, *Public transport - Planning the networks*, HiTrans, Stavenger, Norway

Litman, T., 2007, *Generated Traffic and Induced Travel: Implications for Transport Planning*, Victoria Transport Policy Institute, http://www.vtpi.org/gentraf.pdf

Mackey, B., Keith, H., Berry, S. & Lindenmayer, D., 2008, *Green Carbon: The Role of Natural Forests in Carbon Storage*, ANU E Press, Canberra, http://epress.anu.edu.au/green_carbon/pdf/whole_book.pdf

Mann, E. & Abraham, C., 2006, 'The role of affect in UK commuters' travel mode choices: An interpretive phenomenological analysis', *British Journal of Psychology*, Vol. 97, No. 2, pp.155-176, DOI: 10.1348/000712605X61723

McCarthy, A., 2007, 'Public Transport and Climate Change', *Climate Change – The Transport Response – AITPM Victorian Branch ½ day seminar*, 16 October, Melbourne

McManus, G. and Jean, P., 2008, 'Industry backs cap on petrol in emissions trading scheme', *Herald Sun*, 2 July, http://www.news.com.au/heraldsun/story/0,21985,23955450-661,00.html

Miller, J., Robinson, H. & Lahr, M. 1999, *Estimating Important Transportation-Related Regional Economic Relationships in Bexar County, Texas*, VIA Transit, San Antonio, http://www.vtpi.org/modeshft.pdf

Mitchell, D., 2008, *A Note on Rising Food Prices*, World Bank, Washington DC, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2008/07/28/000020439_20080728103002/Rendered/PDF/WP4682.pdf

Moriarty P, Honnery D, The prospects for global green car mobility, *J Clean Prod* (2007), doi:10.1016/j.jclepro.2007.10.025

National Research Council, 2002, *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards*, National Academy Press, Washington DC

Naylor, R., Liska, R., Burke, M., Falcon, W., Gaskell, J., Rozelle, S. & Cassman, K., 2007, 'The Ripple Effect: Biofuels, food security, and the environment', *Environment*, Vol.49, No.9, pp.31-43

Newman, P. & Kenworthy, J., 1989, *Cities and automobile dependence: An international sourcebook*, Gower Publishing, Aldershot, England

Newstead, S.V., Cameron, M.H., Le, C.M, 2000, *Vehicle Crashworthiness and Aggressivity Ratings and Crashworthiness by Year of Vehicle Manufacture: Victoria and NSW Crashes During 1987-98, Queensland Crashes During 1991-98*, MUARC, Melbourne

OECD, 2008, *Economic Assessment of Biofuel Support Policies*, Organisation for Economic Co-operation and Development, Paris, http://www.oecd.org/dataoecd/19/62/41007840.pdf

Oxfam, 2007, *Bio-fuelling poverty: Why the EU renewable-fuel target may be disastrous for poor people*, Oxfam International, Oxford, http://www.oxfam.org/en/files/bn_biofuelling_poverty_0711.pdf

PTUA, 2008a, *Climate Policy at the Junction*, Public Transport Users Association, Melbourne,

PTUA, 2008b, *Transport governance: Public transport management that works for passengers*, Public Transport Users Association, Melbourne, http://www.ptua.org.au/campaigns/govern/

Quiggin, J., 2007, *Drought, Climate Change and Food Prices in Australia*, School of Economics and School of Political Science and International Studies, University of Queensland, http://www.acfonline.org.au/uploads/res/Climate_change_and_food_prices_in_Australia.pdf

Scheurer, J., Kenworthy, J. & Newman, P., 2005, *Most Liveable and Best Connected?*, Metropolitan Transport Forum, Melbourne, p.7

Spratt, D. & Sutton, P. 2008, *Climate Code Red - the case for emergency action*, Scribe Publications, Melbourne

Stone, J., 2007, *A review of current literature on transport greenhouse emissions and abatement strategies: the potential for greater public transport use in Melbourne*, Australasian Centre for the Governance and Management of Urban Transport, Melbourne

Timilsina, G. & Dulal, H., 2008, *Fiscal Policy Instruments for Reducing Congestion and Atmospheric Emissions in the Transport Sector*, World Bank, Washington DC

Weiss, M., Heywood, J.B., Drake, E.M., Schafer, A. & AuYeung, F.F., 2000, *On the Road in 2020: A Life Cycle analysis of New Automobile Technologies*, Energy Laboratory, Massachusetts Institute of Technology, Cambridge

Zarembo, A. & Maugh, T., 2007, 'Bleak U.N. report on global warming derided as too soft', *Los Angeles Times*, 7 April, available at: http://www.mercurynews.com/healthandscience/ci_5616208